

ASSIGNMENT - I

AKASH A

Q1)

1796 → Origin of steam engine



1806 → First ICE on fuel gas.



1837 → first successful electric locomotive



1896 → first successful electric vehicle



1912 → peak production of EV.



1960 → Concept prototype of 4 series design of EV



1970 → Limited production of EV



1980 → Incorporate technology advance into EV design.



1990 → First gen EV



2000 → Hybridised EVs in emerging level
of gas supply demand

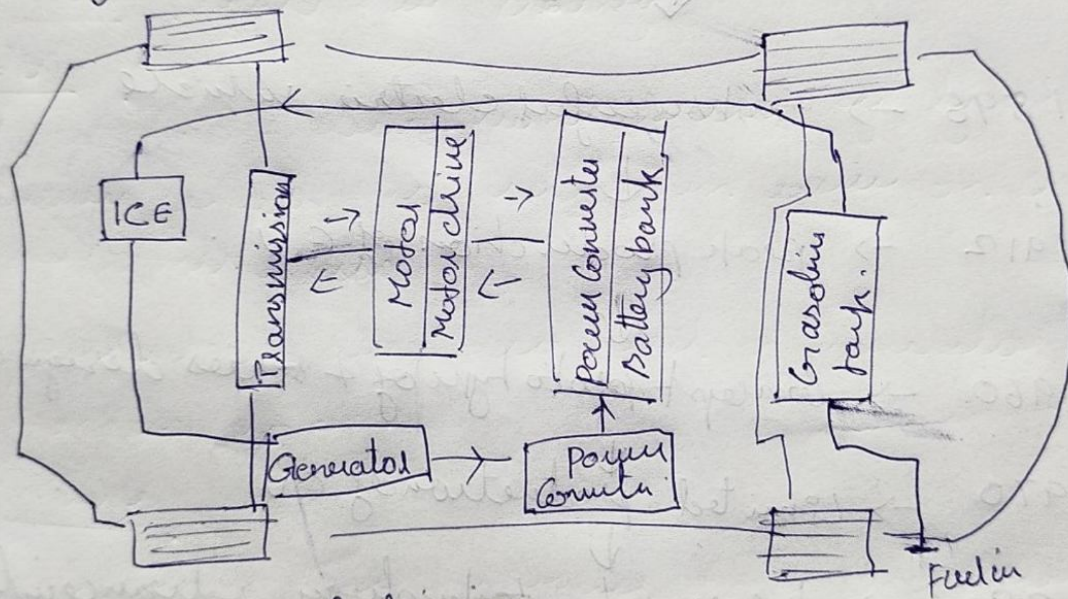
In this 1796 - 1912 is the golden age of electric vehicle

1924 - 1960 is the domination by gasoline car

In 1826 Anyos zellick created the electric motor

In 1886 Thomas Parker was has ~~created~~ started the first production of the EV

Q2) a) Hybrid electric vehicles - Series



Case-1 - normal driving

IC engine

Motor

At this will rotate

2 in motor & 2 in ICE

Case-2 light load.

Case-3-During braking

IC Engine
Motor.

Case-3 - Regenerative braking

Case-4 - Vehicle stop

a) Parallel HEV

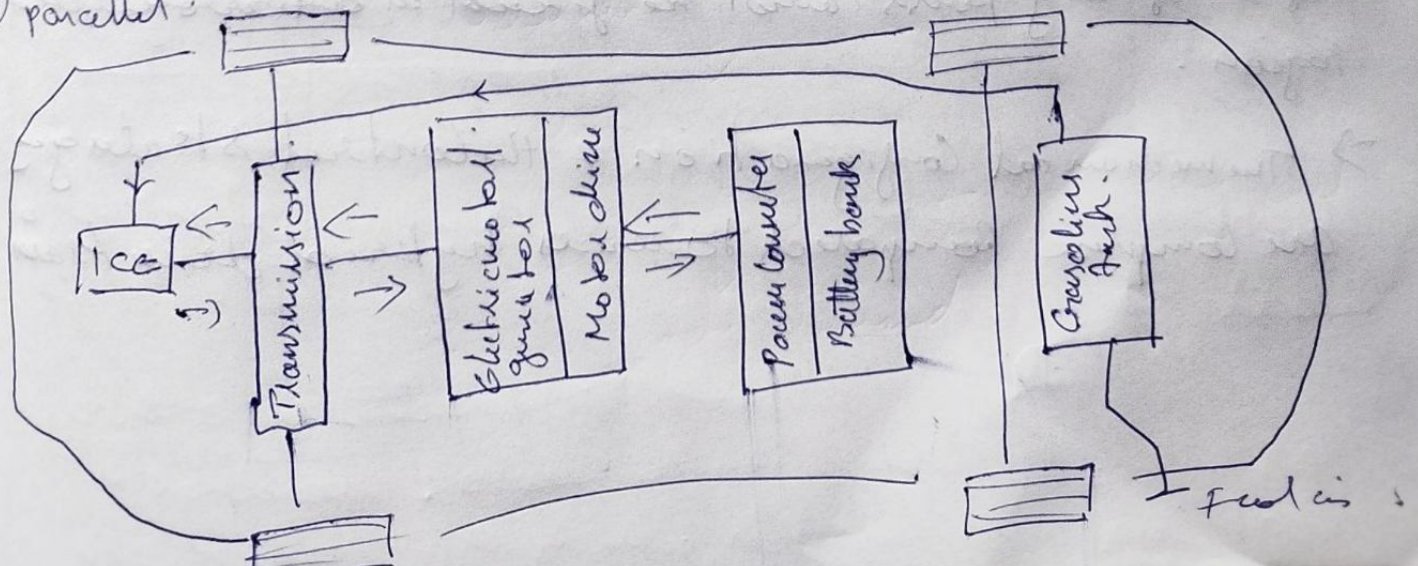
Advantage.

- Mechanical decoupling b/w the ICE and driven wheels allows the ICE operating at its very narrow optimal region.
- Nearly ideal torque-speed chara. of electric motor make multi-gear transmission unnecessary.

Disadvantage.

- Energy is converted twice & reduces the overall η .
- 2 electric machines are needed and a big fraction motor is required because it is the only torque source of the driven wheels.

b) parallel



Case I - ICE

Motor $\rightarrow$ charging

ICE $\rightarrow$ driving

Case II - Electric drive

Motor - driving

ICE - at rest condition

Case III Hybrid mode

Case IV low battery

ICE $\rightarrow$ charging & driving

Case V - Regenerative braking

Adv

$\rightarrow$ Both engine & electric motor directly supply torque to the driven wheels & no energy form conversion occurs, hence energy loss is less

$\rightarrow$ Compactness due to no need of generator & smaller traction motor.

Dis adv

$\rightarrow$ Mech coupling b/w the engine & the driven wheels the engine operating points cannot be fixed in a narrow speed region.

$\rightarrow$ The mechanical configuration & the control strategies are complex compared to series hybrid drive train

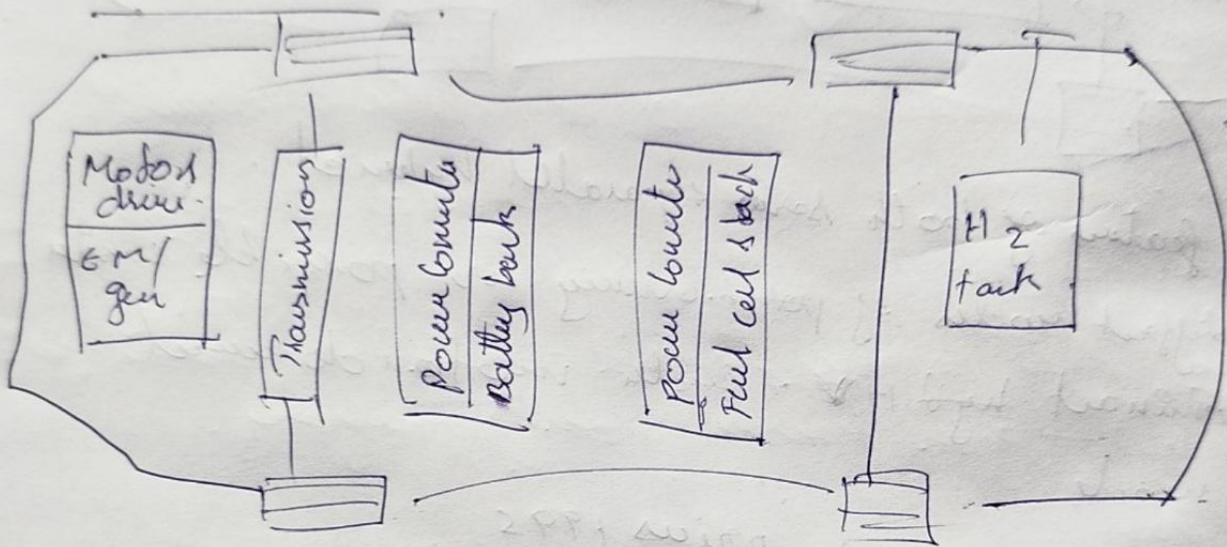
Adm

- Fuel efficient in Massie
- easy to drive

Disorder

- Expensive & Complex to maintain.
- Battery life concerns.

c) Fuel cell EV



Q3) The construction of BLDC is typically similar to a PMSM but can also be scribbled reluctance motor or an induction motor. They may also use neodymium magnets and be outer runner, ~~inner or outer~~. (the stator is surrounded by the rotor, ~~inner~~ inner the rotor is surrounded by the stator or axial the rotor & stator are flat & parallel.

It uses an electronic controller to switch DC currents to the motor windings, producing magnetic fields which effectively rotate

in space and which the permanent magnet rotor follows. The controller adjust the phase & amplitude of the DC current pulses to control the speed & torque of the motor. This control system is an alternative to the mechanical commutator used in many conventional motors.

